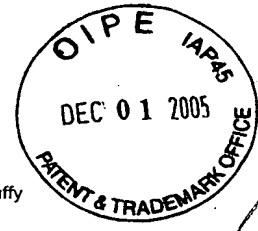


IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



*AF*  
*JPW*

In Re Application of: Stephen J. VESPER

Art Unit: 1645

Application No.: 09/866,793

Examiner: Patricia A. Duffy

Filed: May 30, 2001

Washington, D.C.

For: METHODS FOR ISOLATING AND USING FUNGAL...

Atty.'s Docket: VESPER=1

Date: December 1, 2005

Confirmation No. 5682

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Sir:

Transmitted herewith is a [XX] APPEAL BRIEF in the above-identified application.

[ ] Small Entity Status: Applicant(s) claim small entity status. See 37 C.F.R. §1.27.

[ ] No additional fee is required.

[XX] Fee for Appeal Brief \$500.00.

	(Col. 1)		(Col. 2)		(Col. 3)		SMALL ENTITY		OR	OTHER THAN SMALL ENTITY				
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR		PRESENT EXTRA EQUALS		RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE			
TOTAL	* 16	MINUS	** 20		0		x 25	\$		x 50	\$			
INDEP.	* 6	MINUS	*** 11		0		x 100	\$		x 200	\$			
FIRST PRESENTATION OF MULTIPLE DEP. CLAIM								+ 180	\$		+ 360	\$		
								ADDITIONAL FEE TOTAL		\$	OR	TOTAL		\$

- \* If the entry in Col. 1 is less than the entry in Col. 2, write "0" in Col. 3.
- \*\* If the "Highest Number Previously Paid for" IN THIS SPACE is less than 20, write "20" in this space.
- \*\*\* If the "Highest Number Previously Paid for" IN THIS SPACE is less than 3, write "3" in this space.

The "Highest Number Previously Paid For" (total or independent) is the highest number found from the equivalent box in Col. 1 of a prior amendment of the number of claims originally filed.

[XX] Conditional Petition for Extension of Time

If any extension of time for a response is required, applicant requests that this be considered a petition therefor.

[ ] It is hereby petitioned for an extension of time in accordance with 37 CFR 1.136(a). The appropriate fee required by 37 CFR 1.17 is calculated as shown below:

Small Entity		Other Than Small Entity	
Response Filed Within		Response Filed Within	
[ ]	First - \$ 60.00	[ ]	First - \$ 120.00
[ ]	Second - \$ 225.00	[ ]	Second - \$ 450.00
[ ]	Third - \$ 510.00	[ ]	Third - \$ 1020.00
[ ]	Fourth - \$ 795.00	[ ]	Fourth - \$ 1590.00
	Month After Time Period Set		Month After Time Period Set

[ ] Less fees (\$ \_\_\_\_\_) already paid for \_\_\_ month(s) extension of time on \_\_\_\_\_.

[ ] Please charge my Deposit Account No. 02-4035 in the amount of \$ \_\_\_\_\_.

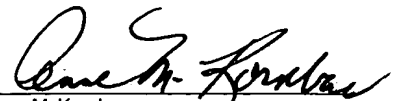
[XX] Credit Card Payment Form, PTO-2038, is attached, authorizing payment in the amount of \$ 500.00.

[ ] A check in the amount of \$ \_\_\_\_\_ is attached (check no. ).

[XX] The Commissioner is hereby authorized and requested to charge any additional fees which may be required in connection with this application or credit any overpayment to Deposit Account No. 02-4035. This authorization and request is not limited to payment of all fees associated with this communication, including any Extension of Time fee, not covered by check or specific authorization, but is also intended to include all fees for the presentation of extra claims under 37 CFR §1.16 and all patent processing fees under 37 CFR §1.17 throughout the prosecution of the case. This blanket authorization does not include patent issue fees under 37 CFR §1.18.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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In re application of:

STEPHEN JOSEPH VESPER

Application No. 09/866,793

Filed: May 30, 2001

MEHTODS FOR ISOLATING AND USING FUNGAL HEMOLYSINS

Examiner: P. A. Duffy  
Art Unit: 1645

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**APPEAL BRIEF**

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Attorney Docket: VESPER1

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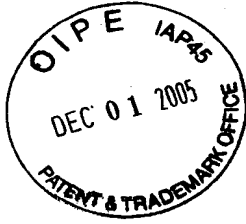


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The present appeal is taken from the Action of the Examiner mailed April 8, 2005, in finally rejecting claims 23-33. A clean copy of these claims, double-spaced, appears in the Appendix to this Brief.

**REAL PARTY IN INTEREST**

The real party in interest is the United States Environmental Protection Agency.

**RELATED APPEALS AND INTERFERENCES**

Undersigned is aware of no related Appeals or Interferences.

**STATUS OF THE CLAIMS**

Claims 1-22 have been cancelled. Claims 34-38 have been withdrawn. Claims 23-33 stand rejected.

**STATUS OF AMENDMENTS**

The amendment filed June 24, 2005, will not be entered even for purposes of appeal. The Notice of Panel Decision from Pre-Appeal Brief Review determined that claims 23-33 are rejected and claims 34-38 are withdrawn.

SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to methods for detecting exposures to fungi in a species-specific manner. This invention is based on the discovery that fungi that were previously not known to produce hemolysins do indeed produce these proteins, which are species-specific. This is useful because different fungi are associated with different diseases. The knowledge of the specific fungus causing the disease can affect prevention methods or treatment protocols. Therefore, it is critical to be able to differentiate human or other animal exposures to a specific fungus, so that the proper medication at the proper dosage can be administered in a timely fashion.

The present invention provides that these same specific hemolysins can be used to quantify the specific fungi in environmental samples. This is useful because one could monitor a hospital, workplace, or home for the presence of problematic fungi in a timely fashion, possibly preventing exposures of the people or animals in these environments.

Although it has been known for years that certain fungal pathogens such as *Candida albicans* and *Aspergillus fumigatus* produced hemolysins, the present invention describes for the first time that other fungi also produce hemolysin. The present application teaches how to use this knowledge to

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provide a useful product/service for the medical and environmental communities. That is, using the process of the present invention, one can determine which if any fungi are present in a sample.

The fungal hemolysin protein may be present in blood, serum, urine, saliva or other measurable body fluid of a human or other animals exposed to the fungus. If the fungus is present in the environment, such as a building, a sample from, e.g., a wall or floor of the building can be taken to determine if a fungus is present in the building or other environment. The method of measurement is not critical and can include GC-MS, MALDI-tof, immunoassays such as ELISA and RIA, or the like.

**GROUNDNS OF REJECTION TO BE REVIEWED ON APPEAL**

1. Claims 23-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaguchi et al. (*Japanese Journal of Medical Mycology* 24(3): Abstract, 1984) in view of Harlow et al. (*Antibodies: A laboratory Manual*, cold spring Harbor Press, 1989, pages 390-393).

2. Claim 33 is rejected under 35 U.S.C. 102(b) as being anticipated by Sakaguchi et al.

3. Claims 23-29 and 33 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

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4. Claims 30-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

5. Claims 30-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

6. Claims 30-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Claims 23-26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. This is a new matter rejection.

In addition to the above grounds of rejection, the specification has been objected to as failing to provide proper antecedent basis for the claimed subject matter, namely, "specific hemolysin-producing fungus."

#### ARGUMENT

1. Claims 23 and 25-29 are not obvious over Sakaguchi et al. in view of Harlow et al. under 35 U.S.C. 103(a)

The Examiner alleges that there is no evidence in the specification that the applicants discovered that certain

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fungi produce hemolysins, which are specific to the particular fungus producing the hemolysin.

The present inventor discovered that hemolysin-producing fungi produce hemolysins that are specific to each fungus. The present inventor discovered that this information can be used to devise assays for these hemolysin-producing fungi based upon detection of the hemolysin that is specific to each fungus. Without the knowledge that each hemolysin producing fungus produces a hemolysin specific for that fungus, the methods of the present invention would be worthless for identifying specific fungi.

Applicant discovered that certain fungi produce hemolysins which are specific to the particular fungus producing the hemolysin. The present invention is directed to methods for assaying for specific hemolysin-producing fungi, which would not be possible if hemolysin-producing fungi did not produce species-specific hemolysin. Paragraph 0015 in the specification as filed specifically states that one object of the invention is to identify strains of fungi using an *in vitro* test. One skilled in the art would thus expect that the invention would be directed to identifying individual strains of fungi. One skilled in the art need not be told *in haec verba* that each fungus produces a unique hemolysin, because it is inherent that the hemolysins are unique if one is able to



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identify different strains of fungi, which is one object of the present invention. If the hemolysins were not unique to each specific fungus, one would not be able to identify different strains of fungi.

The Examiner appears to be confusing antibody specificity with hemolysin specificity. Paragraph 0024 of the specification states that by growing strains of hemolysin producing fungi *in vitro* and isolating the hemolysin, it is now possible to use the protein obtained [to produce antibodies] to identify fungi which are isolated from buildings, homes, schools and the like. If each fungus did not produce a species-specific hemolysin, it would be impossible to identify which fungi are present, or to which fungus or fungi an animal or building has been exposed.

As best this rejection can be understood, Sakaguchi et al. has been cited for teaching that antibodies to a fungal hemolysin can be used to detect infection in an animal infected therewith. Harlow et al. are cited for disclosing methods for producing antibodies.

Sakaguchi et al. injected mice with *A. fumigatus* in order to determine how the fungus infects the body of the mouse. Sakaguchi et al. then sacrificed the mouse and detected viable fungus in the kidney and brain ten days after

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challenge. This information revealed the progress and mechanisms of infection.

It is not understood how the Examiner can extrapolate from a description of a study of the course of a fungal infection in mice that have been deliberately infected with a fungus and subsequent observation of infection in the kidneys, livers, internal organs of the mice, to an assay for a variety of specific fungi which does not involve taking tissue samples from the animal believed to be infected.

Sakaguchi et al knew that the mice had been infected with *A. fumigatus*, and they were trying to determine how the infection affected the organs of the mice. There is nothing in Sakaguchi et al. that even suggests that one would look to hemolysins to determine if an animal had been exposed to one of a number of hemolysin-producing fungi, because Sakaguchi et al. specifically infected the mice with *A. fumigatus*. There was no reason for Sakaguchi et al. to try to identify exposure to any other kind of fungus, because the point of the experiment was to ascertain how *A. fumigatus* infected mice.

Claims 23 and 25-29 are drawn to *A method for determining if an animal has been exposed to a specific hemolysin-producing fungus*. This preamble of the claims limits the claims to a method for determining if an animal has been exposed to a hemolysin-producing fungus. As the Federal

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Circuit said in *Manning v. Paradis*, 296 F3d 1098, 1103; 63 USPQ2d 1681 (Fed. Cir. 2002), "Just as the preamble of a count may define a limitation of the count, so too it may define the intended purpose of the invention." In the present case, the preamble defines the invention as a method for determining if an animal has been exposed to a hemolysin-producing fungus. The Sakaguchi et al. article is irrelevant to the present invention, because Sakaguchi et al. knew that the animal had been infected with a fungus. Sakaguchi et al. had no reason to determine if the animal had been exposed to a hemolysin-producing fungus, because Sakaguchi et al knew that the animals tested had been exposed to *Aspergillus fumigatus*.

**2. Claim 33 is not unpatentable under 35 U.S.C. 103(a) over Sakaguchi et al.**

Claim 33 is drawn to a method for determining if an animal has been exposed to a specific hemolysin-producing fungus by detecting the presence of the hemolysin produced by the fungus in a sample from the animal. Sakaguchi et al. do not try to identify if an animal has been exposed to a fungus, and if so, to which fungus. Rather, Sakaguchi et al. teach a method for determining how a specific fungus infects an animal. The Examiner stated on page 10 of the Office Action mailed April 8, 2005, that the Sakaguchi et al. method would

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inherently do so (*i.e.*, a specific hemolysin could be used to identify each fungus). There is nothing in Sakaguchi et al. that teaches or even suggests that the assay for the hemolysin of *A. fumigatus* could be used to determine if the animal had been exposed to another fungus. Sakaguchi et al. knew that the animals had been exposed to *A. fumigatus* because the researchers had infected the animals with *A. fumigatus* and monitored the progress of the infection of the animal by determining which organs had been invaded by the fungus by detecting the presence of *A. fumigatus* in the organs. There is nothing in Sakaguchi et al. that even suggests that hemolysin-specific fungi produce individual hemolysins. All Sakaguchi et al. disclose is that one can track infection by *A. fumigatus* by monitoring the progress of the fungus through the organs of the animal.

3. **Claims 23-29 and 33 comply with the written description requirement of 35 U.S.C. 112, first paragraph.**

The Examiner alleges that the specification as filed lacks the conception of "species specificity" and the ability to discriminate one fungus from another based on species-specific hemolysin. However, this is in direct contrast to her allegation that Sakaguchi et al. inherently disclose that

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a specific hemolysin can be used to identify a specific fungus, *i.e.*, that a hemolysin is species-specific.

The specification at paragraph 0012 states that an object of the invention is to provide a method and reagent for screening humans and other animals for exposure to hemolysin-producing fungi. Paragraph 0015 states that it is a further object of the invention to identify strains of fungi using an *in vitro* test. This *in vitro* test involves determining the presence of a hemolysin, and correlating the presence of that hemolysin to infection by the fungus that produced the hemolysin. If the hemolysins were not species-specific, it would not be possible to identify strains of fungi. If the hemolysins were not species-specific, the present application would be inoperable, as it is the specific hemolysins that make it possible to identify different species of fungi.

The present invention is directed to methods for detecting fungi that produce hemolysin in order to demonstrate exposure to these hemolysin-producing fungi. Humans do not produce normal antibodies in response to exposure to many fungi or mycelium of many fungi. Therefore, traditional immunoassay methods cannot be used to detect exposure to hemolysin-producing fungi.

The present inventors have devised a method for isolating fungal hemolysin and using the hemolysin proteins

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obtained to demonstrate exposure to fungi for environmental or medical evaluations. The hemolysins produced are specific to each fungus that produces a hemolysin. The fungal hemolysin protein may be present in blood, urine, saliva, or other measurable body fluid of a human or animal infected with the fungi. The assay is conducted with antibodies, produced by conventional techniques, against the particular hemolysin protein. The assay can be any conventional immunoassay, such as ELISA, RIA, or the like.

An objective standard for determining compliance with the written description requirement is, "does the description clearly allow persons of ordinary skill in the art to recognize that the or she invented what is claimed." *In re Gosteli*, 872 F2d 1008, 1012, 10 USPQ 1614, 1618 (Fed. Cir. 1989). For purposes of the present invention, it is assumed that one skilled in the present art is familiar with clinical assay techniques, including immunoassays, to detect antigens in a sample.

It is respectfully submitted that claims 23-29 and 33 contain subject matter that was described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention. The present inventor has described a method for

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isolating hemolysin from a hemolysin-producing fungus at paragraphs 25-27. The specification at paragraphs 28-33 describes how the hemolysin can be used to obtain antibodies, which then are used in an immunoassay to detect presence of the fungus. Paragraph 32 clearly states that the antibodies to fungal hemolysin can be used in a conventional immunoassay to determine if one has been exposed to strains of fungi which produce hemolysin. One skilled in the art of clinical assays is well aware of many conventional immunoassays that can be used to detect antibody-antigen reactions. There is no need to be specific with respect to the particular assay used.

4. **Claims 30-32 comply with the written description requirement of 35 U.S.C. 112, first paragraph.**

The specification beginning at paragraph 36 describes how to determine if a building holds fungi which may be a problem to the inhabitants or users thereof. In this method, a strain of fungus obtained from the building is cultured and the culture filtrate applied to a plate. If the filtrate is shown to be hemolytic, the strain is problematic and may poses health risk.

It is respectfully submitted that this description of screening fungi in a building is perfectly clear to one

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skilled in the art and demonstrates that the inventor possessed the invention at the time of filing the present application. One skilled in the art of assays would certainly know how to obtain a representative sample from a building in order to determine if the building harbored problematic fungi. One skilled in the art would also appreciate that an analysis of the filtrate from the culture would contain hemolysins from any hemolysin-producing fungi present, and could be assayed in the same manner as samples from bodily fluids. One skilled in the art does not need to have each step spelled out in excruciating detail, as one skilled in the art can readily ascertain how to obtain suitable samples and proceed with such an assay.

**5. Claims 30-32 comply with the enablement requirement of 35 U.S.C. 112, first paragraph.**

One skilled in the art of clinical assays or assaying for deleterious microorganisms in a building or other such environment, could read the present specification and readily contrive to conduct such assay without undue experimentation. One skilled in the art of these assays would know how to obtain samples from a building or other environment, and then, as described at paragraphs 25 to 32, assay for the presence of fungal hemolysins in the sample.



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Paragraph 36, which pertains specifically to screening fungi in a building, even discloses the culturing technique for growing the suspected hemolysin-producing fungi.

6. Claims 30-32 point out and distinctly claim the subject matter which application regards as the invention, and thus conform to the requirements of 35 U.S.C. 112, second paragraph.

The Examiner contends that the phrase "obtaining hemolysin from the sample if hemolysin-producing fungi are present in the sample" infers that the assayer know that there is hemolysin-producing fungus in the sample. This is not the case at all. Claim 30 is directed to a method for determining if a building contains a hemolysin-producing fungus. One obtains the sample from the building and, if hemolysin-producing fungi are present in the sample, one recovers hemolysin from the sample and assays it to determine what hemolysin-producing fungi are present in the building. If one knows there are hemolysin-producing fungi in the building, there would be no reason to determine if the building contains a hemolysin-producing fungus. Likewise, if there are no hemolysin-producing fungi in the building, one could not obtain hemolysin-producing fungi from the sample.

**7. Claims 23-26 comply with the written description requirement of 35 U.S.C. 112, first paragraph.**

Claims 23-26 have been amended in the preamble to recite "which hemolysin is species-specific", which the Examiner alleges is new matter. The Examiner's position is that there is no inherent or implicit showing using evidence of specificity on the part of hemolysins from different fungi or different species within the same genus. However, as the Examiner is well aware, there is no requirement that support be *in haec verba* for the claims. It is well understood by those skilled in the art reading the present specification that hemolysin-producing fungi produce hemolysins that are sufficiently specific for each fungus so that one skilled in the art can differentiate among hemolysin-specific fungi, as well as determine which, if any, hemolysin-specific fungi are present in a sample.

While it has not been recited in the specification in the same manner as claims 23-26 are worded, it is clear that one skilled in the art would appreciate that hemolysin-producing fungi produce species-specific hemolysins. Otherwise, it would be impossible to assay for specific hemolysin-producing fungi. That the hemolysin is species-specific is inherent in the hemolysin-producing fungi, or the

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assay of the present invention could not possibly assay for individual fungi. As the court stated, in *Technicon Instruments Corporation v. Coleman Instruments, Inc. et al.*, "By disclosing in a patent application a device that inherently performs a function, operates according to a theory, or has an advantage, a patent applicant necessarily discloses that function, theory or advantage even though he says nothing concerning it. The application may later be amended [to] recite the function, theory or advantage without introducing prohibited new matter." 255 F.Supp. 630, 150 USPQ 227 (N.D. Ill. 1966), aff'd 385 F.2d 391, 155 USPQ 369 (7<sup>th</sup> Cir. 1967).

The Court of Customs and Patent Appeals has long recognized that an invention may be described in different ways and still be the same invention. In *In re Kirchner*, 49 C.C.P.A. 1234, 305 F.2d 897, 904, 134 U.S.P.Q. (BNA) 324, 330 (CCPA 1962), the court held that compliance with section 120 does not require that the invention be described in the same way, or comply with section 112 in the same way, in both applications.

In *Kirchner* the court authorized the addition to the specification of descriptive matter concerning the use of the compounds without loss of the parent application's filing date. In *In re Nathan*, 51 C.C.P.A. 1059, 328 F.2d 1005, 1008-

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09, 140 U.S.P.Q. (BNA) 601, 604 (CCPA 1964), the court held that the later-added limitation to the claims of the compound's alpha orientation was "an inherent characteristic" of the claimed subject matter, and reversed a new matter rejection. The *Nathan* court explained that "a subsequent clarification of or a change in an original disclosure does not necessarily make that original disclosure fatally defective." *Id.* at 1008, 140 USPQ at 603.

It is clear from a reading of the present application that hemolysin-producing fungi produce hemolysin that is species specific, so that individual fungi can be identified. It is respectfully submitted that the recitation of "species-specific hemolysin" is not new matter, but is an inherent property of the hemolysin produced by hemolysin producing fungi.

**OBJECTIONS/REJECTIONS MAINTAINED**

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. The Examiner alleges that there is no basis for the term "specific hemolysin-producing fungus."

Paragraph 0033 of the specification as filed states,  
  
The present invention thus provides a method to determine if a human or other animal has been exposed to a hemolysin-producing fungus such as *Stachybotrys chartarum*. By analyzing samples from a

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human or other animal for antibodies to a hemolysin-producing fungus, it is now possible to determine if the human or other animal has been exposed to such a fungus.

It is respectfully submitted that paragraph 33 clearly states what is claimed herein, paragraphs 0028-0032 teaches how to prepare antibodies to the fungal hemolysin. In each instance, it is clear that each fungus produces a hemolysin that can be detected. There is nothing in the entire specification that would lead one skilled in the art that multiple fungi produced the same hemolysin, *i.e.*, that an assay for a fungal hemolysin would not reveal which fungus produced the hemolysin.

#### CONCLUSION

Appellants respectfully submit that the Examiner's rejections are unreasonable, that no *prima facie* case of obviousness has been established, and that the claims are fully enabled by the specification and the written description.

The prior art provides no incentives to test for a specific hemolysin-producing fungus. One skilled in the art, reading the specification as a whole, can appreciate that the inventor possessed the invention at the time of filing, and one skilled in the art can practice the present invention without undue experimentation.

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The rejections should be reversed and such is respectfully prayed.

Respectfully submitted,

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**CLAIMS APPENDIX**

23. A method for determining if an animal has been exposed to a specific hemolysin-producing fungus, which hemolysin is species-specific, comprising:

- a. contacting a sample from said animal with labeled antibodies which bind to the hemolysin produced by the fungus or to active fragments of the hemolysin; and
- b. detecting any complex formed between the labeled antibodies and the hemolysin or active fragments thereof.

24. The method according to claim 23 wherein the sample from the animal is selected from the group consisting of blood, urine, and saliva.

25. The method according to claim 23 wherein the label is selected from the group consisting of enzyme, radioactive, chemiluminescent, and fluorescent labels.

26. The method according to claim 23 wherein the fungus is selected from the group consisting of *Stachybotrys chartarum*, *Aspergillus fumigatus*, *Candida albicans*, and *Penicillium chrysogenum*.

27. A method for determining if an animal has been exposed to a specific hemolysin-producing fungus comprising:

- a. contacting a sample from said animal with labeled antibodies which bind to a hemolysin produced by the fungus or to active fragments of the hemolysin produced by the fungus;
- b. detecting any complex formed between the labeled antibody and any hemolysin or active fragments thereof in the sample;
- c. wherein the fungal hemolysin used to prepare the labeled antibodies is isolated by culturing a strain of fungus, removing cells and debris from the culture to recover supernatant, and isolating hemolytically active fractions of fungal hemolysin.

28. The method according to claim 27 wherein the label is selected from the group consisting of enzyme, radioactive, chemiluminescent, and fluorescent labels.

29. The method according to claim 27 wherein the fungus is selected from the group consisting of *Stachybotrys chartarum*, *Aspergillus fumigatus*, *Candida albicans*, and *Penicillium chrysogenum*.



30. A method for determining if a building contains a hemolysin-producing fungus comprising:

- a. obtaining a sample from the building;
- b. obtaining hemolysin from the sample if hemolysin-producing fungi are present in the sample;
- c. contacting the sample with labeled antibodies which bind to the fungal hemolysin or to active fragments of the fungal hemolysin; and
- d. detecting any complex formed between the labeled antibodies and the fungal hemolysin or active fragments thereof.

31. The method according to claim 30 wherein the label is selected from the group consisting of enzyme, radioactive, chemiluminescent, and fluorescent labels.

32. The method according to claim 30 wherein the fungus is selected from the group consisting of *Stachybotrys chartarum*, , *Candida albicans*, and *Penicillium chrysogenum*.

33. A method for determining if an animal has been exposed to a specific hemolysin-producing fungus comprising detecting the presence of the hemolysin produced by the fungus in a sample from the animal, the presence of the hemolysin in the sample indicating that the animal has been exposed to the hemolysin-producing fungus.

**WITHDRAWN CLAIMS**

34. A method for determining if an animal has been exposed to a specific hemolysin-producing fungus by determining if a sample from the animal contains antibodies to a hemolysin, comprising:

- a. contacting a sample from said animal with labeled hemolysin from a suspected hemolysin-producing fungus; and
- b. detecting any complex formed between the labeled hemolysin and antibodies to the hemolysin.

35. The method according to claim 34 wherein the sample from the animal is selected from the group consisting of blood urine, and saliva.

36. The method according to claim 34 wherein the label is selected from the group consisting of enzyme, radioactive, chemiluminescent, and fluorescent labels.

37. The method according to claim 34 wherein the fungus is selected from the group consisting of *Stachybotrys chartartum*, *Candida albicans*, and *Penicillium chrysogenum*.

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38. A method for determining if a building contains fungi which may be deleterious to occupants of the building comprising:

- a. obtaining a strain of a fungus from the building;
- b. culturing the fungus;
- c. applying the culture filtrate to a plate; and
- d. detecting the presence of hemolysin in the plate.

TABLE OF CASES AND STATUTES

CASES
<i>In re Gosteli</i> , 872 F.2d 1008, 1012, 10 USPQ 1614, 1618 (Fed. Cir. 1989).
<i>In re Kirchner</i> , 49 C.C.P.A. 1234, 305 F.2d 897, 904, 134 U.S.P.Q. (BNA) 324, 330 (CCPA 1962)
<i>In re Nathan</i> , 51 C.C.P.A. 1059, 328 F.2d 1005, 1008-09, 140 U.S.P.Q. (BNA) 601, 604 (CCPA 1964)
<i>Manning v. Paradis</i> , 296 F.3d 1098, 1103; 63 USPQ2d 1681 (Fed. Cir. 2002)
<i>Technicon Instruments Corporation v. Coleman Instruments, Inc. et al.</i> , F.Supp. 630, 150 USPQ 227 (N.D. Ill. 1966), <i>aff'd</i> , 385 F.2d 391, 155 USPQ 369 (7 <sup>th</sup> Cir. 1967)
STATUTES
35 U.S.C. 102(b)
35 U.S.C. 103(a)
35 U.S.C. 112, first paragraph
35 U.S.C. 112, second paragraph

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**EVIDENCE APPENDIX**

**DECLARATION OF STEPHEN J. VESPER SUBMITTED WITH  
AMENDMENT FILED JULY 8, 2002**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTY.'S DOCKET: VESPER1

In re Application of:	)	Art Unit: 1645
S.J. VESPER	)	Examiner: SHAHMAN-SHAH
Serial No.: 09/866,793	)	Confirmation No. 5682
Filed: May 30, 2001	)	Washington D.C.
For: METHODS FOR ISOLATING	)	
AND USING FUNGAL	)	
HEMOLYSINS	)	

DECLARATION OF STEPHEN VESPER

I, Stephen Vesper, do declare that I am an inventor of the above-identified application. In order to demonstrate that extrapolating information in the specification as filed for *Stachybotrys chartarum* to other fungi, experiments were conducted under my direction and control to demonstrate that it is easy to determine which fungi produce hemolysin, and that it is easy to obtain hemolysin from a variety of fungi.

As demonstrated by the results shown in Table 1, one skilled in the art can readily determine if a fungus exhibits hemolytic activity.

Table 1. Observations of hemolytic activity by indoor fungi. In each case, 10 µl of each conidial suspension was plated on sheep's blood agar and incubated at 37 and 23°C. The "asterisks" represent amount of growth. One asterisk is small amount of growth, two is moderate growth and three represents good growth. If there is no growth then there is no hemolysin. To ensure that the conidia were alive they were all grown at 23°C on SBA. (Only in a few cases were hemolysins produced at 23°C.)

Fungal species	EPA #	Growth Hemolysin at		Growth Hemolysin at	
		37°C	37°C	23°C	23°C
<i>Absidia corymbifera</i>	133	+++	No	+++	No
<i>Acremonium strictum</i>	547	No	-	**	No
<i>Alternaria alternata</i>	628	*	No	**	No
<i>Aspergillus auricomus</i>	392	No	-	**	No
<i>Aspergillus caespitosus</i>	371	*	No	+++	No
<i>Aspergillus versicolor</i>	524	*	Yes	*	No
<i>Aspergillus candidus</i>	329	No	-	*	No
<i>Aspergillus carbonarius</i>	343	*	No	**	No
<i>Aspergillus cervinus</i>	351	No	-	*	No
<i>Aspergillus clavatus</i>	350	*	No	**	No
<i>Aspergillus flavipes</i>	610	*	Yes	**	No
<i>Aspergillus flavus</i>	532	+++	Yes	**	No
<i>Aspergillus fumigatus</i>	526	+++	Yes	+-	No
<i>Aspergillus niveus</i>	361	**	Yes	**	No
<i>Aspergillus niger</i>	89	+++	Yes	+++	Yes
<i>Aspergillus ochraceus</i>	426	*	Yes	**	No
<i>Aspergillus paradoxus</i>	373	No	-	**	No
<i>Aspergillus parasiticus</i>	525	+++	Yes	**	No
<i>Aspergillus puniceus</i>	368	No	-	**	No
<i>Aspergillus restrictus</i>	458	No	-	*	No
<i>Aspergillus sclerotiorum</i>	237	*	Yes	**	No
<i>Aspergillus sydowii</i>	421	**	Yes	**	No
<i>Aspergillus tamarii</i>	607	+++	No	+++	No
<i>Aspergillus terreus</i>	231	+++	Yes	**	No
<i>Aspergillus unguis</i>	364	**	Yes	**	No
<i>Aspergillus utahus</i>	427	*	No	**	No
<i>Aspergillus versicolor</i>	524	*	Yes	*	No
<i>Aspergillus wentii</i>	608	No	-	**	Yes
<i>Aureobasidium pullulans</i>	701	No	-	*	No
<i>Chaetomium globosum</i>	396	**	No	+++	No
<i>Cladosporium cladosporioides</i>	178	No	-	*	No
<i>Cladosporium cladosporioides</i>	174	No	-	*	No
<i>Cladosporium herbarum</i>	69	No	-	*	No
<i>Cladosporium sphaerospermum</i>	416	No	-	*	No
<i>Emicella nidulans</i>	527	+++	Yes	**	Yes
<i>Emicella variegata</i>	684	*	Yes	**	No

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<i>Epicoccum nigrum</i>	335	No	-	**	No
<i>Eurotium chevalieri</i>	530	*	No	*	No
<i>Memnoniella echinata</i>	394	*	Yes	**	No
<i>Myrothecium verrucaria</i>	115	***	Yes	**	No
<i>Mucor racemosus</i>	138	No	-	***	No
<i>Faecilomyces varioti</i>	75	**	Yes	*	No
<i>Penicillium aethiopicum</i>	310	*	Yes	**	No
<i>Penicillium atramentosum</i>	601	No	-	**	No
<i>Penicillium aurantiogriseum</i>	441	No	-	**	No
<i>Penicillium brevcompactum</i>	435	No	-	**	Yes
<i>Penicillium caesescens</i>	437	*	Yes	*	No
<i>Penicillium chrysogenum</i>	467	*	Yes	***	No
<i>Penicillium citreonigrum</i>	277	No	-	*	No
<i>Penicillium citrinum</i>	448	*	Yes	*	No
<i>Penicillium coprophilum</i>	600	No	-	**	No
<i>Penicillium corylophilum</i>	434	No	-	*	No
<i>Penicillium crustosum</i>	445	No	-	**	No
<i>Penicillium decumbens</i>	430	*	Yes	*	No
<i>Penicillium digitatum</i>	316	No	-	*	No
<i>Penicillium expansum</i>	54	No	-	**	No
<i>Penicillium fellutanum</i>	431	*	Yes	*	No
<i>Penicillium glandicola</i>	449	No	-	**	No
<i>Penicillium griseofulvum</i>	456	*	Yes	*	No
<i>Penicillium implicatum</i>	452	No	-	*	No
<i>Penicillium islandicum</i>	616	*	Yes	*	No
<i>Penicillium italicum</i>	59	No	-	*	No
<i>Penicillium janthinellum</i>	521	**	Yes	**	No
<i>Faecilomyces lilacinus</i>	548	*	Yes	**	No
<i>Penicillium lividum</i>	292	No	-	*	No
<i>Penicillium melinii</i>	451	No	-	*	No
<i>Penicillium miczynskii</i>	443	No	-	**	No
<i>Penicillium olsonii</i>	523	No	-	**	No
<i>Penicillium oxalicum</i>	497	***	Yes	**	No
<i>Penicillium purpurogenum</i>	306	*	No	*	No
<i>Penicillium raistrickii</i>	442	No	-	**	No
<i>Penicillium restrictum</i>	613	*	Yes	*	No
<i>Penicillium roquefortii</i>	312	No	-	**	No
<i>Penicillium sclerotiorum</i>	453	No	-	**	No
<i>Penicillium simplicissimum</i>	603	*	Yes	**	No
<i>Penicillium spinulosum</i>	447	No	-	**	No
<i>Penicillium variable</i>	322	No	-	*	No
<i>Penicillium verrucosum</i>	440	No	-	**	No
<i>Penicillium waksmanii</i>	432	No	-	**	No
<i>Rhizopus stolonifer</i>	58	No	-	***	No



<i>Scopulariopsis brevicaulis</i>	408	**	Yes	**	No
<i>Scopulariopsis brumptii</i>	409	-	No	*	No
<i>Scopulariopsis chartarum</i>	176	No	-	*	No
<i>Stachybotrys chartarum</i>	388	**	Yes	**	No
<i>Trichoderma asperellum</i>	538	**	No	**	No
<i>Trichoderma harzianum</i>	147	*	No	***	No
<i>Trichoderma longibrachiatum</i>	519	***	Yes	***	No
<i>Trichoderma viride</i>	405	No	-	***	No
<i>Ulocladium atrum</i>	629	*	Yes	**	No
<i>Ulocladium botrytis</i>	630	*	Yes	**	No
<i>Ulocladium chartarum</i>	631	-	No	**	No
<i>Walleria sebi</i>	419	No	-	-	No

As shown in Table 1, the screening for the production of a hemolysin is simply done by placing conidia (spores) of a given fungus on 5% sheep's blood agar (SBA) (Becton Dickinson, Sparks, MD) and incubating the plates at 37°C. In a week, 92 fungi were screened for hemolysin production by looking for typical darkening then clearing of the red blood cells around the colony. This is simple, inexpensive and fast. Then all one has to do is take a fungus that produce an hemolysin and grow in TSB broth as the patent teaches. Then collect the supernatant. This is important because the homogenate (like used for asp-hemolysin) introduces a huge number of other fungal proteins whereas the supernatant is relatively free of most other fungal proteins and makes the whole purification much easier and more meaningful since the secreted form of the hemolysin is the active form. Then the hemolysin is purified using standard protein purification procedure described in the patent:

Step 1- size fractionation centrifugation; Step 2- ion chromatography; Step 3- gel filtration. Obviously there is slight variations in buffers, salt concentration, gel matrix etc. but these are accepted variations that any protein biochemist expects.

To demonstrate how easy it is to isolate other fungal hemolysins using the specified directives in the patent application, I isolated the hemolysin from *Penicillium chrysogenum* using the same steps which are growth of culture in tryptic soy broth (TSB), size fractionation centrifugation of supernatant, ion chromatography, and gel filtration.

The indoor fungus *Penicillium chrysogenum* was grown on pieces of dry wall, as described (19) and the conidia recovered. Approximately  $1 \times 10^8$  conidia were added to 500 ml of TSB. The cultures were incubated at 23°C for 48h on an incubator shaker at 100 rpm. Then the cultures were transferred to an incubator shaker and culture for 72 h at 34°C. The fungal mass was then removed by filtering through a Whatman 541 filter paper in a Buchner funnel. The recovered filtrate was centrifuged in a Millipore Centricon plus 30 filter apparatus with a MW cut-off of 30-kDa (Millipore, Bedford, MA) following the manufacturer's instructions. The concentrate was then subjected to ion exchange

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chromatography. DEAE-cellulose (Sigma, St. Louis, MO) was hydrated in 20 mM Tris-HCl pH 8.0 for 1 hr and then poured into a column giving a final bed of 3 x 0.5 cm. Then 0.5 ml of the concentrate was introduced on the top of the column. The bed was eluted with 5 ml of the 20 mM Tris-HCl buffer and five drop fractions were collected throughout the elution and then 10  $\mu$ l of each fraction was plated on sheep's blood agar (SBA) (Becton Dickinson, Sparks, MD) and hemolysis noted.

Then carboxy methyl cellulose (Sigma, St. Louis, MO) was hydrated in 20 mM Tris-HCl pH 8.0 for 24 h and then poured into a column giving a final bed of 3 x 0.5 cm. Then the five active fractions from the DEAE-cellulose ion chromatography were introduced on the top of the column. The bed was eluted with 5 ml of the 20 mM Tris-HCl buffer and five drop fractions were collected throughout the elution and then 10  $\mu$ l of each fraction was plated on sheep's blood agar (SBA) (Becton Dickinson, Sparks, MD) and hemolysis noted.

The five hemolytically active fractions from the second ion exchange chromatography were then subjected to gel filtration using Sephadex G 200 (Pharmacia, Piscataway, NJ) hydrated for 72 h in the running buffer containing 0.2 M sodium azide and poured into a chromatography column to give a final bed 0.25 by

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24 cm. Five drop fractions were collected at 1.5 ml per h using a fraction collector (ISCO, Lincoln, NE). Then 10 µl of each fraction was plated on SBA and incubated at 37°C and hemolysis noted at 24 h. The five hemolytically active fractions from the first gel filtration were then subjected to gel filtration using Sephadex G 100-50 (Sigma, St. Louis, MO) hydrated for 5 days in the running buffer containing 0.4 M sodium azide, 5 mM EDTA, and 1 mM PMSF and poured into a chromatography column to give a final bed 0.5 x 14 cm. Five drop fractions were collected at 1.5 ml per h using a fraction collector (ISCO, Lincoln, NE). Then 10 µl of each fraction was plated on SBA and incubated at 37°C and hemolysis noted at 48 h. The five most hemolytically active fractions from this second gel filtration were combined and then desalted twice using the D-Salt™ Polyacrylamide 6000 desalting column (Pierce, Rockford, IL.). The final desalted solution was frozen at -80°C and lyophilized using a Spin Vac (Savant Instruments, Farmingdale, NY) resulting in a lyophilized pellet.

#### Electrophoresis analysis

Native protein electrophoresis and SDS-PAGE were performed using the Bio-Rad Laboratories Mini-Protean™ 3 Cell and precast 4-15% Tris-HCL gels (BioRad, Hercules, CA), as per the manufacturer's instructions.

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Gels were stained with silver using the Bio-Rad Silver Stain Plus™ kit by following the manufacturer's instructions (Bio-Rad, Hercules, CA).

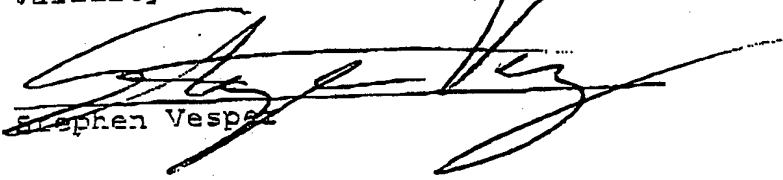
To determine if the chrysolysin was active, a purified preparation was divided in half and run in two separate wells in a precast 4-15% Tris-HCl gel. After native protein electrophoresis, half of the gel was stained with silver, as described above, and the other half was placed on an SBA plate and incubated at 37°C for 48 h and hemolysis process photographed.

Figure 1 shows the active purified hemolysin band from *P. chrooygenum*. All of the steps described in the patent were used with modifications that any protein chemist would anticipate.

I hereby further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 81 of the United States Code and that such willful false statements may jeopardize the

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validity of the application or any patent issued thereon:

  
~~Stephen Vespa~~

7-5-02

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Figure 1. Purified hemoysin, chrysolysin, produced by *Penicillium chrysogenum*. Left panel shows purified band of chrysolysin in "native" gel. Center panel shows appearance of sheep's blood agar (SBA) after exposure to purified chrysolysin in "native" gel for 24 h and the right panel shows appearance of SBA after 48 h exposure (SBA incubated at 37°C).



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**RELATED PROCEEDINGS APPENDIX**

There are no related proceedings in connection with the subject application.